

AMENDMENTS TO THE CLAIMS:

Claim 1 (Original): A continuous flotation process for iron-containing sulphides in ores and concentrates of ores includes the following steps:

- (a) adjusting the pH of an aqueous pulp of the ores or concentrates of the ores to be in the range of 6.5-8.5;
- (b) adding a reducing agent to modify an iron hydroxide film on the surface of iron-containing sulphides in the ores or ore concentrates to enable adsorption of a collector onto iron-containing sulphides;
- (c) adding the collector to the pulp prior to, during, or after adding the reducing agent in step (b); and
- (d) aerating the pulp to increase the pulp potential to a level sufficient to allow collector adsorption onto the iron-containing sulphides; and
- (e) bubbling gas through the pulp and thereby subjecting the aqueous pulp to froth flotation to produce a froth containing said sulphide containing minerals.

Claim 2 (Original): The process defined in claim 1 includes controlling the addition of the reducing agent in step (b) by reference to the change in pulp potential as the reducing agent is being added in step (b).

Claim 3 (Previously Presented): The process defined in claim 1 includes adding a complexant to the pulp prior to or during step (b) of adding the reducing agent to react with the reduced iron produced in step (b) to minimise iron hydroxide reforming a film on the iron-containing sulphides.

Claim 4 (Previously Presented): The process defined in claim 1 wherein the iron-containing sulphides contain one or more valuable metals selected from the group that includes nickel, gold, or platinum group metals.

Claim 5 (Previously Presented): The process defined in claim 1 wherein step (a) includes

adjusting the pH of the aqueous pulp to be in the range of 7.0-8.0.

Claim 6 (Previously Presented): The process defined in claim 5 wherein step (a) includes adjusting the pH of the aqueous pulp to be in the range of 7.1-7.5.

Claim 7 (Previously Presented): The process defined in claim 1 wherein step (a) includes adjusting pulp pH by adding acid to the pulp.

Claim 8 (Previously Presented): The process defined in claim 1 wherein step (a) includes adjusting pulp pH as the pulp flows through a first tank.

Claim 9 (Previously Presented): The process defined in claim 1 wherein step (a) includes controlling the flow of pulp through the first tank to be plug flow.

Claim 10 (Previously Presented): The process defined in claim 1 wherein step (b) includes controlling the addition of the reducing agent by adding the reducing agent to the pulp to decrease the pulp potential by at least 150 mV.

Claim 11 (Previously Presented): The process defined in claim 10 wherein step (b) includes controlling the addition of the reducing agent by adding the reducing agent to the pulp to decrease the pulp potential by at least 200 mV.

Claim 12 (Previously Presented): The process defined in claim 1 wherein step (b) includes controlling the addition of the reducing agent by adding the reducing agent to the pulp to decrease the pulp potential by no more than 350 mV.

Claim 13 (Previously Presented): The process defined in claim 1 wherein step (b) includes intensively mixing the pulp while adding the reducing agent.

Claim 14 (Previously Presented): The process defined in claim 1 wherein step (b) includes adding the reducing agent to the pulp as the pulp flows through a second tank.

Claim 15 (Previously Presented): The process defined in claim 1 wherein the reducing agent is an oxy-sulphur compound which dissociates in the aqueous media to form oxy-sulphur ions having the general formula



where n is greater than 1; y is greater than 2; and z is the valance of the ion.

Claim 16 (Original): The process defined in claim 15 wherein the oxy-sulphur compound is dithionite.

Claim 17 (Previously Presented): The process defined in claim 3 wherein the complexant is selected from the group that includes citric acid and oxalic acid.

Claim 18 (Original): The process defined in claim 17 wherein the complexant is citric acid.

Claim 19 (Previously Presented): The process defined in claim 3 includes adding the complexant to the pulp during step (b) of adding the reducing agent to the pulp.

Claim 20 (Previously Presented): The process defined in claim 3 includes adding the complexant to the pulp during step (b) of adding the reducing agent to the pulp as the pulp flows through the second tank.

Claim 21 (Previously Presented): The process defined in claim 1 wherein the collector is selected from the group that includes xanthates, dixanthogen, xanthate esters, dithiophosphates, dithiocarbamates, thionocarbamates, and mercaptans.

Claim 22 (Original): The process defined in claim 21 wherein the collector is a xanthate.

Claim 23 (Previously Presented): The process defined in claim 1 wherein step (c) includes adding the collector to the pulp during step (b) of adding the reducing agent to the pulp.

Claim 24 (Previously Presented): The process defined in claim 23 wherein step (c) includes adding the collector to the pulp during step (b) of adding the reducing agent to the pulp as the pulp flows through the second tank.

Claim 25 (Previously Presented): The process defined in claim 1 includes controlling the process so that the average residence time of pulp flowing through the second tank is less than 45 seconds.

Claim 26 (Original): The process defined in claim 25 includes controlling the process so that the average residence time of pulp flowing through the second tank is approximately 30 seconds.

Claim 27 (Previously Presented): The process defined in claim 1 includes controlling the flow of pulp through the second tank to be plug flow.

Claim 28 (Previously Presented): The process defined in claim 1 wherein step (d) includes aerating the pulp downstream of the second tank.

Claim 29 (Previously Presented): The process defined in claim 1 wherein step (e) includes separating the froth of floated iron-containing sulphides from the pulp and thereafter recovering valuable metals from the froth.

Claim 30 (Withdrawn): An apparatus for continuously conditioning iron-containing sulphides in ores in order to facilitate recovery of valuable metals from the floatable iron-containing sulphides, which apparatus includes:

- (a) a first tank for adjusting the pH of an aqueous pulp of the ores containing iron-containing sulphides as the pulp flows through the tank, the first tank having an inlet for receiving a flow of pulp and an outlet for discharging a flow of pH-adjusted pulp;
- (b) a second tank for adding a reducing agent and a collector to the pH-adjusted pulp as the pulp flows through the tank, the second tank having an inlet for receiving the flow of pH-adjusted pulp from the first tank, an outlet for discharging a flow of treated pulp from the second tank, a means for adding the reducing agent to the second tank, a means for adding the collector to the second tank, and a means for intensively mixing the pulp in the tank; and
- (c) a means for aerating the treated pulp from the second tank to allow adsorption of the collector onto the iron-containing sulphides surface.

Claim 31 (Withdrawn): The apparatus defined in claim 30 wherein the second tank also includes a means for adding a complexant into the second tank.

Claim 32 Withdrawn): The apparatus defined in claim 30 wherein the inlet for the pH-adjusted pulp is in the lower section of the second tank and the outlet for treated pulp is in an upper section of the second tank.

Claim 33 (Withdrawn): The apparatus defined in claim 32 wherein the second tank includes a partition that divides the tank into a lower chamber and an upper chamber and the partition has a central opening that allows flow of pulp between the chambers.

Claim 34 (Withdrawn):The apparatus defined in claim 30 wherein the means for adding the reducing agent, the collector, and the complexant to the second tank are adapted to add these reagents to the lower chamber, whereby in use there is thorough mixing of the pulp and the reagents in the lower chamber and plug flow of the pulp and the reagents upwardly through the chambers.

Claim 35 (Withdrawn): The apparatus defined in claim 30 wherein the first tank includes a means for venting air from the tank.

Claim 36 (Withdrawn): The apparatus defined in claim 30 wherein the means for aerating the pulp from the second tank includes a launder having an aeration screen located at the outlet of the second tank.